ASCO - AUSTRALIAN STANDARD CLASSIFICATION OF OCCUPATIONS

*(Previously: ASCO - Australian Standard Classification of Occupations
Introduction to ASCO Publications - First Edition)*

This publication provides an introduction to the Australian Standard Classification of Occupations (ASCO). ASCO was introduced progressively into ABS collections from May 1986. This new classification replaced the previously used Classification and Classified List of Occupations (CCLO).

This publication provides an overview of the ASCO structure, the ASCO Coding System, and a guide to interpreting ASCO statistics. It lists the principal applications of ASCO and discusses the relationship of ASCO to other occupation classifications including the CCLO. It describes currently available and forthcoming ASCO publications and products. It also provides information on other publications dealing with the relationship between ASCO and CCLO. It outlines ASCO services available from the ABS.

1 A Skill-based Classification

ASCO was developed as an Australian national standard for the production and analysis of labour force statistics, human resources management, education planning, the listing of job applicants and vacancies, the provision of occupational information, conducting social and epidemiological research and for vocational guidance. The development of ASCO was undertaken jointly by the ABS and the (now) Department of Employment, Education and Training (DEET). A key objective in the development of ASCO was to provide a classification which would ensure the comparability of statistics produced by all government departments and agencies, especially the ABS, the Commonwealth Employment Service (CES) and the Department of Immigration, Local Government and Ethnic Affairs (DILGEA).

The classification which has been developed is based on the principle that occupations should be classified using intrinsic criteria, rather than extrinsic criteria such as industry, as was the common practice in the past. It was widely recognised by users in industry and government that previous occupation classifications suffered from a number of deficiencies, including a lack of category definitions, lack of statistical balance and ill defined classification criteria. Users expressed a strong demand for a skill-based classification.

This presented a significant challenge to the ASCO Project team, since it was recognised that the concept of *skill* could be interpreted in various ways. It was not, therefore, possible to design a structure which would meet the needs of all people at all times. After considerable research, the principal criteria chosen as the basis of classification were skill level and skill specialisation.

Skill level is defined as the range and complexity of the set of tasks involved. The greater the range and complexity of the set of tasks the greater the skill level of the occupation. It is measured operationally as the amount of formal education, on-the-job training and previous experience usually necessary before an individual can perform the set of tasks satisfactorily.

Skill specialisation is defined in terms of four variables: field of knowledge required, tools and equipment used, materials worked on, and goods or services produced.

The structure of ASCO has ..... s major group, minor group, unit group and occupation. A profile of the ASCO structure and a listing of the major and minor groups are shown overleaf.

2 Profile of the ASCO structure

The structure of ASCO has four levels:

> major group
> minor group
> unit group
> occupation.

Major Groups are:

> the broadest level of the classification
> denoted by 1-digit codes
> distinguished from each other on the basis of skill level.

There are 8 Major Groups.

Minor Groups are:

> subdivisions of the major groups
> denoted by 2-digit codes (the relevant major group code, plus an additional digit)
> distinguished from other minor groups in the same major group on the basis of broadly stated skill specialisation.

There are 52 Minor Groups.

Unit Groups are:

> subdivisions of the minor groups
> denoted by 4-digit codes (the relevant minor group code, plus 2 additional digits)
> distinguished from other unit groups in the same minor group on the basis of a finer degree of skill specialisation.

There are 282 Unit Groups.

Occupations are:

> subdivisions of the unit groups
> denoted by 6-digit codes (the relevant unit group code, plus a hyphen and 2 additional digits)
> distinguished from other occupations in the same unit group on the basis of detailed skill level and specialisation
> sets of jobs which involve the performance of a common set of tasks.

There are 1079 Occupations.

The following example illustrates these conventions:

Level	Code	Title
Major group	2	Professionals
Minor group	28	Artists and Related Professionals
Unit group	2805	Designers and Illustrators
Occupation	2805-13	Graphic Designer

3 The ASCO Structure: Major and Minor Groups

1   MANAGERS AND ADMINISTRATORS

11   Legislators and Government Appointed Officials

12   General Managers

13   Specialist Managers

14   Farmers and Farm Managers

15   Managing Supervisors (Sales and Service)

16   Managing Supervisors (Other Business)

2   PROFESSIONALS

21   Natural Scientists

22   Building Professionals and Engineers

23   Health Diagnosis and Treatment Practitioners

24   School Teachers

25   Other Teachers and Instructors

26   Social Professionals

27   Business Professionals

28   Artists and Related Professionals

29   Miscellaneous Professionals

3   PARA-PROFESSIONALS

31   Medical and Science Technical Officers and Technicians

32   Engineering and Building Associates and Technicians

33   Air and Sea Transport Technical Workers

34   Registered Nurses

35   Police

39   Miscellaneous Para-Professionals

4   TRADESPERSONS

41   Metal Fitting and Machining Tradespersons

42   Other Metal Tradespersons

43   Electrical and Electronics Tradespersons

44   Building Tradespersons

45   Printing Tradespersons

46   Vehicle Tradespersons

47   Food Tradespersons

48   Amenity Horticultural Tradespersons

49   Miscellaneous Tradespersons

5   CLERKS

51   Stenographers and Typists

52   Data Processing and Business Machine Operators

53   Numerical Clerks

54   Filing, Sorting and Copying Clerks

55   Material Recording and Despatching Clerks

56   Receptionists, Telephonists and Messengers

59   Miscellaneous Clerks

6   SALESPERSONS AND PERSONAL SERVICE WORKERS

61   Investment, Insurance and Real Estate Salespersons

62   Sales Representatives

63   Sales Assistants

64   Tellers, Cashiers and Ticket Salespersons

65   Miscellaneous Salespersons

66   Personal Service Workers

7   PLANT AND MACHINE OPERATORS, AND DRIVERS

71   Road and Rail Transport Drivers

72   Mobile Plant Operators (except Transport)

73   Stationary Plant Operators

74   Machine Operators

8   LABOURERS AND RELATED WORKERS

81   Trades Assistants and Factory Hands

82   Agricultural Labourers and Related Workers

83   Cleaners

84   Construction and Mining Labourers

89   Miscellaneous Labourers and Related Workers

4 A Structured Coding System

Most of the principal applications of ASCO require a tool for the coding of information about a particular job to the new classification in an accurate, consistent and efficient manner. The adoption of classification criteria based on the skills required to perform the tasks involved means that ASCO is a classification which is very demanding of information for accurate coding. As the result of an extensive program of feasibility testing, it was found that, in order to allocate responses from statistical collections reliably to any level of the ASCO structure, data on occupation *tasks* as well as the occupation *title* were needed.

Accordingly, the development of the new classification was accompanied by the development of a well defined but complex, structured coding system, described in the *ASCO Manual Coding System: Unit Group Level* (ABS Catalogue number 1225.0). This system enables occupation responses to be coded to the unit group level of the classification with a high degree of accuracy and consistency. It is designed to utilize, in a systematic way, the responses from up to four distinct questions: occupation title, main tasks performed, kind of industry description and employer's name. The use of these responses is controlled by the assignment of different status levels to information from each item. Primary importance is given to the occupation title but extensive use is made of main tasks performed in the job; restricted use can also be made of information given in response to questions on kind of industry and employer's name.

In its manual form, however, the coding system, while accurate and consistent, is somewhat complicated, restricts the range of choices that coders can make, and results in a much slower coding operation than was typical with the various occupation classifications used previously. Hence, the manual implementation of the ASCO Coding System requires extensive coder training and is more expensive.

5 Computer Assisted Coding (CAC)

5.1 Development of ASCO Expert

To reduce the costs of coding in large scale statistical collections while preserving the gains in data quality obtained by structured coding, a computer assisted version of the system was developed on the basis of the manual coding system.

The computer assisted coding system combines the coder's ability to interpret occupation title and task responses with the fast searching and matching abilities of a microcomputer. The system was conceived as a stand-alone individual coder productivity tool running on IBM XT, AT or PS/2 compatible microcomputers. It was initially designed to facilitate the coding of 6.5 million occupation responses to ASCO in the 1986 Census of Population and Housing, where it achieved significantly higher coding rates than would have been obtained using the manual system.

Since then the system has been rewritten with enhanced functionality and efficiency for release as the *ASCO Expert Coding System: Unit Group Level* (ABS Catalogue number 1224.0).

5.2 Features of ASCO Expert

The principal features of the system include:

* minimisation of key entry of data;
* fast and efficient searching;
* carefully designed matching rules to determine the range and order of choices presented to the coder;
* ability to code a wider range of occupation responses as a result of the progressive relaxation of matching rules when necessary to obtain a code;
* faster coding rates achieved by the presentation of choices on the screen in such a way as to allow fast assimilation of information and fast reaction by the coder;
* reduction in training requirements by a reduction in the number of rules and procedures to be implemented manually and by simplification of the choices presented to the coder;
* improved data quality as a result of greater control over the implementation of coding rules; and
* faster resolution of queries by the provision of on-line access to the classification structure and all the definitional material in the classification.

ASCO Expert is designed to assign the same codes as the Manual Coding System and uses the same coding index. In practice, however, results obtained using ASCO Expert tend to be more consistent and more accurate than those obtained using the manual system; the query rate (the incidence of cases where the coder cannot assign a code using the standard procedures) also tends to be lower.

The coding systems currently available assign 4-digit codes for the 282 categories at the unit group level of the classification. A system which assigns 6-digit occupation level codes is now being developed for those users who have sufficiently detailed information; it will be released in computer assisted format during 1990 and in manual form subsequently.

In order to code jobs accurately to the occupation level of the classification, it is desirable to have explicit information on the supervisory role of workers as well as their trained/trainee status. Many of the distinctions made between occupations in the same unit group depend on such information. When it is not available, unit group *not further defined* codes can be assigned as described in section 6.3.

5.3 Future Enhancements

Subject to user demand and available ABS resources, future enhancements to ASCO Expert could include an interactive tutorial and a computer assisted query resolution system.

The Tutorial is intended to teach coders how to use ASCO Expert by providing step by step instruction in which the coder's learning is ensured by requiring active participation. The tutorial would be accessible while running ASCO Expert, so that a coder may go over any unfamiliar parts of the coding procedures.

The Query Resolution System will help coders or those supervising coding operations to assign codes to difficult responses not adequately covered by the coding index. The system will utilise the definitional material in the classification in addition to an index consultation procedure to assign codes.

5.4 Leasing ASCO Expert

ASCO Expert is available from the ABS on an annual lease basis. Significant discounts apply to the lease of multiple copies. Organisations interested in leasing ASCO Expert should complete the attached form: *Request for a Free Quotation: ASCO Expert.*

6 Interpreting ASCO Statistics

6.1 Interpreting ASCO Titles

All principal titles in the classification have been carefully chosen to describe the content of the major, minor, unit group or occupation as precisely as possible. However, the appropriateness of the titles has been constrained by the need to keep the titles as brief as possible to facilitate their use as headings in statistical tables. Limitations of language have meant that many words used in principal titles are used in a more restricted sense than those same words are used in everyday speech. This applies particularly to words such as *manager, professional, para-professional, clerk,* tradesperson and *labourer* which are used in major group titles.

All principal titles used in ASCO are defined in classification definitions which consist of a lead statement specifying the scope of the group, a skill level statement, a set of primary tasks and a list of related occupations in other groups. These definitions are published in the *ASCO Statistical Classification* (ABS Catalogue number 1222.0) and the *ASCO Occupation Definitions* (ABS Catalogue number 1223.0). Reference to these publications is essential to ensure the correct interpretation of ASCO statistics.

To gain a detailed appreciation of the composition of particular groups in the classification, users of ASCO

statistics should also be familiar with the ASCO coding strategy and coding indexes. The coding indexes are updated regularly to extend their coverage of occupation titles. As part of this process, the definitions of ASCO groups are inevitably broadened by interpretation. In subsequent revisions of the classification, the group definitions will be updated to reflect these changes. Statistical analysts should consult the ASCO Coding Index: Numerical Order to review all index entries which result in the assignment of particular codes.

There are separate coding indexes for the unit group and occupation levels of the classification. They are contained in a series of publications describing the ASCO Coding System which are discussed in greater detail in Section 10.2 of this paper.

6.2 Interpreting Residual Categories

Like most other classifications, ASCO contains *residual* categories at minor, unit group and occupation level. These categories usually contain occupations which are precisely defined but numerically small. They are only included where experience has demonstrated they are necessary.

Residual categories at the minor group level are termed *miscellaneous* and have codes which usually end in the digit 9; at the unit group level they are termed *other* and have codes which end in the digits 99; and at the occupation level they are termed *not elsewhere classified* and have codes which end in the digits 99.

Residual categories are not designed as dump groups for inadequately described occupations. The ASCO Coding System is designed to ensure that they are not used for this purpose. In the 1986 Census of Population and Housing, only 6.28% of occupation responses were coded to residual categories in ASCO.

6.3 Interpreting Not Further Defined Categories

ASCO has specific provision for the statistical representation of jobs which are inadequately described and jobs which involve the performance of a wider range of tasks than that specified at the level of the classification chosen as the coding level for a particular application.

In practice, it is often difficult to distinguish between specific jobs which are inadequately described and less specialised jobs which require the performance of a wide range of tasks. Hence, the same statistical convention is used to represent both instances. The convention involves coding such records to the next highest level of the structure which is sufficiently broad to include all possibilities implied by the available information.

The convention is implemented by the specification of a set of codes to represent major, minor or unit group level *not further defined (nfd) categories*. They are represented by codes ending in two or more zeros. They are only used when necessary to process particular responses.

When coding at the unit group level, the appropriate minor group nfd code is created by adding 00 to the two digit minor group code; the appropriate major group nfd code is created by adding 000 to the one digit major group code. Hence, at the unit group level, the number of valid ASCO codes is 334 (= 282 unit group codes + 52 minor group nfd codes - 8 minor group groups with only one unit group + 8 major group nfd codes).

When coding at the occupation level, this approach is extended in the obvious way: the appropriate unit group level nfd code is created by adding -00 to the four digit unit group code; the appropriate minor group nfd code is created by adding 00-00 to the two digit minor group code; and the appropriate major group nfd code is created by 000-00 to the one digit major group code.

The coder or query resolver using the ASCO Manual Coding System must generate the nfd codes when necessary. ASCO Expert usually generates the nfd codes automatically when they are required. Provision for processing these codes must be made in editing and output specifications.

In the 1986 Census of Population and Housing, 6.33% of all occupation responses were coded to major or minor group level nfd codes. This figure comprises 5.36% of all responses coded to major group level nfd codes and 0.97% of all responses coded to minor group level nfd codes.

7 Applications of ASCO

7.1 ABS Statistical Collections

ASCO is now used in all ABS censuses and surveys where occupation data are collected, including the five yearly Census of Population and Housing, the Monthly Population Survey and the annual Survey of Employee Earnings and Hours. In these collections, data are coded at the unit group level but it is currently planned that occupation responses obtained in the 1991 Census of Population and Housing will be coded at the occupation level of ASCO.

In 1990, ASCO will be introduced into administrative by-product statistics such as births, deaths, and divorces. These data will be coded at minor group level using an automatic coding system operating on occupation title responses only. Data on overseas arrivals and departures will be coded to the unit group level of ASCO from April 1990.

7.2 Listing Job Applicants and Employment Vacancies.

The Commonwealth Employment Service (CES) is committed to adopting the ASCO First Edition classification for the listing of all job applicants and vacancies. This is planned to occur in 1991.

7.3 Australia's Immigration Program.

In 1989, DILGEA adopted ASCO for the coding of the occupations of all applicants for immigration to Australia. ASCO is also used as a guide in assessing the skill level of some applicants in the points tested independent and concessional family categories.

7.4 Employment Injury Statistics

The National Occupational Health and Safety Commission (Worksafe Australia) has adopted ASCO as part of the National Data Set for Compensation-based Statistics. ASCO is now widely used by public and private sector organisations in the reporting of data on employment injuries.

7.5 Education Planning

State Departments of Technical and Further Education (TAFE) are assigning ASCO codes for the expected occupational outcomes of all TAFE courses. The resulting statistics are used by DEET for educational planning and for estimating labour market supply.

7.6 Affirmative Action Programs

The Affirmative Action Agency recommends ASCO for use by companies in reporting on progress in the implementation of Affirmative Action programs. A significant proportion of Australia's largest companies have adopted ASCO for this purpose.

7.7 Human Resource Management Systems

Many organisations in Australia are adopting ASCO as the basis of their human resource management systems.

The use of ASCO in such applications has a number of advantages. Firstly, ASCO was developed in Australia as a skill based classification to suit Australian conditions. Secondly, it provides an organisation with statistics on its own labour force which are directly comparable with all of the occupation statistics available from the ABS. Thirdly, it facilitates the generation of reports required regularly by other government agencies such as the Affirmative Action Agency and Worksafe Australia. Lastly, it will facilitate the listing of vacancies with the CES when it adopts the ASCO First Edition Classification.

A number of commercially available human resource management systems already provide for the use of ASCO.

7.8 The Measurement of Socio-economic Status

In the absence of more appropriate data items, many researchers use an individual's occupation as a surrogate for his or her socio-economic status. ASCO was not specifically designed for this purpose. However, the major groups in the classification are distinguished on the basis of skill level which is operationally defined in terms of the length and type of training usually required for satisfactory performance in an occupation.

Insofar as there are socio-economic rewards for skill, the major group code assigned to an individual's occupation may serve as a surrogate for his or her socio-economic status. The major limitation to the use of ASCO for such purposes is that the classification of occupations does not take into consideration the concept of status in employment (employer, self-employed, wage and salary earners, unpaid family helpers). It is possible to combine ASCO categories with status in employment categories to form a derived item which would be a more adequate measure of socio-economic status.

Another approach is to develop an occupational prestige scale in which occupations are ranked in order of social prestige. An individual can then be assigned an occupational prestige score based on his or her occupation.

Some researchers have produced such a scale on the basis of the old CCLO unit groups. This approach involves using a panel of people to assign subjective prestige ratings to a relatively small set of occupations; specifying a regression model to estimate these subjective ratings on the basis of a range of variables including income, education, age, sex, and status in employment; and using the estimated regression coefficients to extend the prestige scale to cover all occupations.

A similar scale has now been constructed on the basis of ASCO unit groups (F.L.Jones: 'Occupational Prestige in Australia: A New Scale' published in *Australian and New Zealand Journal of Sociology*, volume 25 number 2, July 1989).

Another application of occupation data in the measurement of socio-economic status involves using characteristics of the distribution of occupations by area (e.g. suburb) to provide a socio-economic ranking of areas. Such measures often used include the number of employed persons in managerial and professional occupations as a percentage of the employed labour force, or the number of employed persons in non-manual occupations as a percentage of the employed labour force. Researchers wishing to use ASCO for this type of application might consider using the number of employed persons in major groups 1 and 2 or the number of employed persons in major groups 1, 2, 3 and 4 as a percentage of the employed labour force.

The ABS has recently developed a set of five distinct socio-economic indices which have been used to rank geographic areas throughout Australia on the basis of data from the 1986 Census of Population and Housing. The indices are based on a range of variables representing aspects of income, education, occupation, family structure etc.

The smallest areas ranked are Collection Districts (CDs) which, in urban areas, typically consist of a small group of suburban blocks. Rankings will also be available for larger areas such as Local Government Areas (LGAs) and Statistical Local Areas (SLAs) and postcodes. Further information will be available in an information paper *Socio-economic Indices for Areas* to be published in mid 1990.

7.9 Other Applications

Other applications of ASCO include career education and vocational guidance. In a number of states, ASCO is being used by state government departments of employment, education and training as the basis of career education packages for school leavers. The ABS understands that a number of private organisations are developing vocational guidance systems based on ASCO.

ASCO is being used in social science and epidemiological research in Australian universities. For example, ASCO is used to code a large number of data items (e.g. occupations of respondent at different time periods, spouse, father, paternal and maternal grandfather) in the National Social Science Survey conducted by the Research School of Social Sciences, Australian National University.

The Australian Institute of Family Studies, the Australian Institute of Health, and the Australian Council for Education Research all use ASCO in processing their sample surveys.

ASCO is also used by private sector organisations as a key variable in a number of statistical series providing an index of employment vacancies based on the coding of newspaper job advertisements.

A number of Australia's largest banks and finance companies are currently evaluating ASCO for the coding of customers' occupations for market research purposes.

8 Job Content Factors in ASCO

It was originally envisaged that ASCO would contain a set of Job Content Factors (JCFs) for each occupation in the classification. JCFs were to consist of coded information covering *Worker, Materials, Functions and Context* components as well as a set of statistical indicators.

Worker components included the amount of formal education, on the job training and experience usually necessary for satisfactory performance in the job; Holland codes; and special requirements such as licences, dress, and auditory perception. The materials components included subject matter knowledge required and equipment used. The function components covered mental, physical and social activities. Context components included environmental location and conditions, time constraints and monetary rewards. The statistical indicators included estimated labour market size and a predominant industry indicator defined in terms of the Australian Standard Industrial Classification (ASIC).

The JCFs were developed for and published in the *ASCO Working Draft* (AGPS, Canberra, 1983) but resources available did not permit their further development and adaptation to the First Edition structure.

There has been significant user interest in the JCFs particularly in applications such as vocational guidance, workers compensation assessment, rehabilitation counselling and the analysis of occupation specific morbidity and mortality. It may be possible to complete their development if sufficient user sponsorship is available.

9 ASCO and Other Occupation Classifications

9.1 Relationship between ASCO and CCLO

CCLO was used to code occupation data in Censuses of Population and Housing between 1961 and 1986, in household and employer based surveys until 1986, and in administrative by-product statistics up to 1990.

CCLO was modelled on the first edition (1958) of the International Standard Classification of Occupations (ISCO). In principle, the CCLO was based on the criterion of type of work performed. In practice, the CCLO was criticised for being dependent on a multiplicity of classification criteria such as industry, institutional sector, status in employment, education and sex.

The CCLO consisted of 10 major groups which ranged in size from almost 30% down to 0.5% of the labour force. By contrast, the 8 ASCO major groups range in size from around 17% down to 7% of the labour force. The CCLO had 393 categories at the unit group level but 90% of all jobs in the Australian labour force were coded to less than 10% of the unit groups. ASCO has only 282 unit groups but, in the 1986 Census of Population and Housing, 90% of all responses coded to the unit group level of the classification were coded to 85% of the unit groups.

Conceptually ASCO and CCLO are based on very different classification principles and it is not feasible to develop a simple code-for-code link between the two

classifications. Users should also be aware that CCLO was itself periodically revised between 1961 and 1981.

To provide at least a statistical representation of the relationship between ASCO and CCLO, the ABS dual coded a 5% sample of responses from the 1986 Census of Population and Housing. The tables on pages 13 and 14 are based on this dual coded sample.

Table 1 shows the frequency and percentage distribution of the Australian labour force by ASCO major group

Table 2 shows the frequency and percentage distribution of the Australian labour force by CCLO major group

Table 3 shows the percentage composition of each ASCO major group in terms of CCLO major groups

Table 4 shows the percentage composition of each CCLO major group in terms of ASCO major groups.

Further information on this statistical link can be found in publications listed in Section 10.4.

It is recommended that organisations which have been using CCLO in their own activities and wish to maintain continuity with previously coded data should either:

a) dual code new data to both ASCO and CCLO for a period of time or;

b) Re-code the old data to ASCO if the necessary records are available. Use of the ASCO Expert Coding System described above may make this option more attractive.

9.2 International Comparability

When it was first published in 1986, ASCO was significantly different from most other occupation classifications used by national and international statistical agencies. This was most evident in its classification of jobs performed by manual workers and in the creation of a new major group, Para-professionals, covering some jobs performed by non-manual workers.

The International Standard Classification of Occupations (ISCO) published by the International Labour Office (ILO), Geneva has recently been revised using a similar conceptual approach to that developed for ASCO. Many national statistical agencies are currently revising their occupation classifications along similar lines.

The revised international classification referred to as ISCO-88 has four levels. It consists of 10 major groups, 28 sub-major groups, 116 minor groups and 390 unit groups. ASCO has 8 major groups, 52 minor groups, 282 unit groups and 1079 occupations. The occupation level is not defined in ISCO-88. It is expected that individual countries will develop an occupation level if their national requirements justify the necessary work.

The ten major groups in ISCO-88 closely resemble the eight ASCO major groups. The most significant difference at major group level is that ISCO-88 has identified Skilled Agricultural and Fishery Workers as a separate major group (Major Group 6), whereas ASCO includes most occupations in that group (Farmers) as a minor group in Major Group 1, Managers and Administrators. ISCO-88 also has a broader definition of Major Group 3, Technicians and Associate Professionals, than that used in ASCO Major Group 3, Para-professionals. ISCO-88 includes some of the more skilled occupations found in ASCO in Major Groups 5 and 6 in its Major Group 3.

ISCO-88 has a separate Major Group 0, Armed Forces. In ASCO, jobs held by members of the armed services are classified together with their civilian equivalents where these exist and to a number of specific unit groups otherwise.

At the unit group level, the differences between ASCO and ISCO-88 are quite marked as ISCO-88 has retained some measure of comparability with ISCO-68.

10 ASCO Products

10.1 Editions of ASCO

The ASCO publications described in this paper are labelled as **First Edition**. Care should be taken by persons and organisations intending to implement ASCO in their activities, that only first edition publications are used. In particular, potential users of ASCO should not use the *ASCO Working Draft* nor the *CES Occupational Dictionary* (AGPS, Canberra, 1983) both of which contain similar draft material which is superseded by the First Edition.

The *ASCO Working Draft* was published as part of the user consultation process during the development of ASCO. Two very different classification structures, referred to as Structures A and B, were presented in this publication. After extensive consultation with users, Structure B was chosen as the basis for developing the ASCO First Edition.

In the absence of any other acceptable standard, many users adopted one or other of the structures published in the *ASCO Working Draft* as an interim measure pending the release of the First Edition. One of the principal users in this category was the CES which adopted Structure A.

A conversion list was produced in 1987 by DEET, to assist users of Structures A or B in converting to the First Edition. It consists of an occupation title based index with multiple codes on each entry. Titles are listed in alphabetical order as opposed to code order. The

publication is available from AGPS bookshops (AGPS Catalogue No. 87 1991 7).

Machine readable versions of this conversion list, sorted in alphabetical order or , Structure A, Structure B or First Edition code order are available from the ABS. The four products are listed on the attached order form for ASCO floppy disk products.

It is expected that after some years of use ASCO will be revised both in terms of its structure, and its occupation definitions, to take account of changes over time in the Australian labour force. It is presently anticipated that this second edition will be produced in time for its use in the 1996 Census of Population and Housing. Within the First Edition there will be no changes to the structure of ASCO, but there will be new releases of coding publications and products to allow users the benefits of improved index coverage and developments in coding technology and methodology.

10.2 ASCO First Edition Publications

The following ABS publications and products are available now or planned for publication in the near future. The leading number is the ABS catalogue number which should be used when ordering or making inquiries. An order form for existing ASCO publications, an order form for forthcoming ASCO publications and an order form for ASCO floppy disk products are attached.

1220.0 ASCO Statistical Manual
(expected release)

This publication describes the development of ASCO as a statistical classification and provides a comprehensive guide to the use of ASCO in statistical collections. It describes the methodology used in the development of the classification, the conceptual basis of the structure and the conduct of the question evaluation and feasibility testing programme. It outlines the logical basis of the ASCO Coding System and addresses such issues as the data items recommended for use in different collection methodologies, question wording, and factors to be considered when choosing the appropriate level of coding (major group, minor group, unit group or occupation level).

1221.0 Information Paper
(revised April 1990)

This paper gives an overview of the ASCO structure, the ASCO Coding System and a guide to interpreting ASCO statistics. It lists the principal applications of ASCO and discusses the relationship between ASCO and CCLO and ASCO and ISCO. It describes currently available and forthcoming ASCO publications and products. It also provides information on other publications dealing with the relationship between ASCO and CCLO. It outlines ASCO services available from the ABS.

1222.0 ASCO Statistical Classification (1986)

This publication is intended for users who wish to understand the structure and content of the classification as an aid in interpreting ABS statistics. It is also a necessary resource document for use in resolving coding queries. It is in three parts:

- Part One - *The Conceptual Basis of ASCO* - describes the ASCO structure, outlines the history of the development of the classification and explains the underlying concepts.

- Part Two - *Structure and Group Definitions* - is the main part of the publication. Its purpose is to enable users to understand the structure of ASCO and thereby to interpret ABS statistics.

  Its first two sections comprise a summary of the ASCO classification criteria and a profile of the ASCO structure. The third section comprises the group definitions. These define and describe the 8 major groups, 52 minor groups and 282 unit groups in the classification. At the level of the unit group, detailed information is provided on the skill level required and tasks performed. A list of the occupation titles within each unit group is also provided, including alternative and specialisation titles.

- Part Three - *Keyword Index of Structure Titles* - provides a pathway into the ASCO structure. Its purpose is to enable statistical users to locate all principal, alternative and specialisation titles (and their associated ASCO codes) under a particular keyword. For example the keyword *librarian* is shown in the index as being included in 2799 Medical Record Librarian, 2911 Librarian and 5401 Computer Tape Librarian.

1223.0 ASCO Occupation Definitions (April 1990)

This publication comprises the definitions of the 1079 occupations at the finest level of the classification and the Keyword Index of Structure Titles. A companion volume to the *Statistical Classification*, it is intended for those who require detailed occupational information. It is a necessary reference document for occupation level coding as defined in the *ASCO Manual Coding System: Occupation Level*.

1224.0 ASCO Expert Coding System: Unit Group Level (expected release May 1990)

This product enables users to code accurately and efficiently to the unit group level of ASCO. Codes can be recorded on disk together with any other information (eg. record number) which may be required. The details of any

responses which result in a query being raised by coders can also be recorded on disk.

The system is supplied with extensive documentation and is available on three 5¹/₄" by 360K floppy disks, one 5¹/₄" by 1.2M floppy disk, two 3¹/₂" by 720K floppy disks or one 3¹/₂" by 1.44M floppy disk. The system runs on IBM XT, AT or PS/2 compatible microcomputers operating under MS-DOS 2.11 or later versions. It requires 640K RAM and may be run from floppy disk although a hard disk will enhance performance. An install program is provided for configuring the program to the machine requirements of the user.

It includes the following printed documents:

> *Users' Manual*
> *Coders' Manual*
> *Coding Index: Alphabetical Order*
> *Coding Index: Numerical Order*

The *Users' Manual* provides all the information necessary to set up and run a coding operation using ASCO Expert. It comprises five parts, as follows:

- Part One - *Package Contents* - briefly describes the items in the package.

- Part Two - *Overview* - explains the principles on which the ASCO Coding System is based, the use of the system to improve efficiency and accuracy in coding, and the advantages of ASCO Expert over a fully automatic coding system and a manual coding ASCO system.

- Part Three - *Getting Started* - tells users how to install the system, the different ways to configure the system and how to get ready for coding.

- Part Four - *System Guide* - provides details of the technical aspects of the system for programmers or system managers.

- Part Five - *Query Resolution Guide* - teaches query resolvers how to resolve coding queries using the six main procedures in the ASCO coding methodology. It includes examples of the sorts of query that may arise.

The *Coders' Manual* is in two parts:

- Part One - *Training Guide* - is intended to teach coders to use ASCO Expert and takes coders step by step through the coding procedures. The guide is organised into lessons with examples and exercises with answers.

- Part Two - *Reference Guide* - provides a quick reference for coders who are already familiar with the use of ASCO Expert.

The *Coding Index: Alphabetical Order* is a hard copy version of the index used by the Expert Coding System and is provided to assist in query resolution. The index is based on responses actually obtained in censuses and surveys. It assumes that the data to be coded will contain details of the respondent's occupation title, the main tasks usually performed in the occupation and information about the industry of the employer. It is presented in alphabetical order of occupation title. Where task or industry information is required for assignment of a code, the additional information follows the title after a slash.

The *Coding Index: Numerical Order* is primarily provided to assist in resolving queries. It lists the entries of the coding index in numerical order so that all entries referring to the same unit group are listed together.

1225.0 ASCO Manual Coding System: Unit Group Level (1987)

This is the principal document for use in coding manually to the unit group level of ASCO. It is presented in five parts:

- The *Implementation Guide* provides all the information necessary to implement the manual coding system in a statistical collection.

- The (Manual) *Training Guide* is to train coders in the recommended coding procedures. The material is divided into lessons, which are presented in increasing order of difficulty. The lessons include examples and exercises with answers.

- The *Coders' Guide* provides coders who have already been trained in ASCO coding with a quick reference document on coding procedures.

- The *Query Resolution Guide* provides guidance on how to resolve those cases which cannot be coded using the standard procedures (queries).

- The *Coding Index: Alphabetical Order* and the *Coding Index: Numerical Order* are described above under publication 1224.0.

The *Manual Coding System: Unit Group Level* is being revised in the light of experience in coding ABS collections, particularly the 1986 Census of Population and Housing and will be re-issued in 1990. The revision will ensure compatibility with the *ASCO Expert Coding System: Unit Group Level*.

1226.0 ASCO Expert Coding System: Occupation Level (expected release)

This product provides a computer-based system similar to the unit group level system, but assigns 6-digit codes where data is of sufficient quality to enable coding at the most detailed level of ASCO, the occupation level. It incorporates the procedures defined in the *ASCO Manual Coding System: Occupation Level.*

1227.0 ASCO Manual Coding System: Occupation Level (expected release after 1226.0)

This publication specifies the procedures and provides the indexes for the manual coding of occupation data to the 1079 categories at the most detailed level of ASCO. It is intended for users who wish to assign 6-digit ASCO codes on the basis of relatively detailed information such as is available from human resource management systems, job vacancy specifications or responses in special purpose statistical collections.

1228.0 ASCO Keyword Index of Unit Group Tasks (expected release after 1224.0)

This index lists, in alphabetical order, all keywords used in unit group definitions in the *ASCO Statistical Classification*, together with the appropriate codes and the sentences in which the keyword appears. The keywords are verbs indicating main tasks performed. It will assist users who have detailed information about tasks performed to locate all relevant ASCO unit groups. It will be useful in query resolution.

1229.0 ASCO Keyword Index of Occupation Tasks (expected release after 1226.0)

This index lists, in alphabetical order, all keywords used in the *ASCO Occupation Definitions*, together with the appropriate occupation codes and the sentences in which the keyword appears.

The ASCO Dictionary (AGPS, 1986)

The Dictionary was developed jointly by the (now) Department of Employment, Education and Training and the ABS, and published in 1986 by the Australian Government Publishing Service. It includes the ASCO Structure, major, minor and unit group definitions, detailed descriptions for 1079 distinct occupations covering all jobs in the Australian labour force, and an alphabetic index of occupations.

10.3 Classification Structure, Definitions and Indexes on Magnetic Media

Some of the above documents or parts thereof are available as floppy disk products in $5^{1}/_{4}$" by 360K, $5^{1}/_{4}$" by 1.2M, $3^{1}/_{2}$" by 720K and $3^{1}/_{2}$" by 1.44M IBM standard formats. They are:

Description	*Magnetic Media Product No.*
Structural Lists	1240.0
Keyword Index of Structure Titles	1241.0
Structure and Group definitions	1242.0
Occupation Definitions	1243.0
Coding Index: Unit Group Level	1245.0
Coding Index: Occupation Level	1247.0

ASCO First Edition / Working Draft
Cross Index:

Alphabetical order	1281.0
Structure A code order	1282.0
Structure B code order	1283.0
First Edition code order	1284.0

An order form for ASCO floppy disk products is attached.

10.4 ASCO-CCLO Link Publications

A number of publications specifically provide information to assist in the comparison of statistics coded to ASCO with statistics coded to the CCLO; others contain some information on this subject. These publications are:

2182.0 Census 86 - Australian Standard Classification of Occupations/Classification and Classified List of Occupations: Link

This publication provides a description of ASCO and provides data on comparability of statistics produced using ASCO with those using CCLO. It is based on the 5% dual coded sample.

2199.0 Census 86 - Australian Standard Classification of Occupations/Classification and Classified List of Occupations: Link File; Magnetic.

The link file contains certain characteristics of persons selected in the 5% dual coded sample and allows the user to generate a matrix of cells in which the two occupation codes can be cross classified by a number of other data items such as state, age, sex, status of worker, industry, income and qualifications. It will enable users to estimate an ASCO distribution for a particular data set coded to CCLO. It will not enable users to replace CCLO codes on individual records with ASCO codes. The file includes technical details. Further information is provided in publication 2182.0.

6203.0 The Labour Force, Australia (August, 1986)

This is a monthly publication containing statistics dealing with employment, unemployment and labour force participation rates. The August 1986 issue contains a

Major Group Matrix showing a cross-tabulation of data, ASCO x CCLO.

6306.0 Distribution and Composition of Employee Earnings and Hours, Australia (May, 1986)

This is an annual publication containing statistics relating to average weekly earnings and hours worked classified by a range of variables including occupation. The 1986 issue contains statistics classified by both ASCO and CCLO, at major, minor and unit group levels. No cross-tabulation of ASCO x CCLO is available.

11 ASCO Services

11.1 ASCO-CCLO Statistical Projections

A series of quarterly projections of occupation statistics from August 1986 back to June 1983 using ASCO and from August 1986 forward to June 1989 using CCLO have been prepared. These projections are based on data from the Labour Force Survey and from the dual coded Census sample mentioned above. This data is not in published form but persons interested in comparing ASCO and CCLO data are invited to make inquiries as indicated at the head of this paper.

The ABS can provide an ASCO/CCLO projection service for organisations which have time series data from their own collections which they wish to maintain.

11.2 ASCO Consultancy/Coding Services

The ABS has a number of services available to organisations who wish to code occupation data to ASCO:

- The ABS offers a consultancy service to organisations which are considering adopting ASCO as the basis of human resource management systems or using ASCO in their own statistical collections. These services are charged at an ABS standard rate.

- The ABS will, where facilities are available, lease ASCO Expert and appropriate hardware at an hourly rate. This service is designed for organisations where the amount of coding required is significant but does not justify the cost of an annual lease of the ASCO Expert System.

- The ABS will provide a complete coding service. This option is designed for organisations where the amount of coding does not justify the training and set-up costs.

Contact the ABS for further details of these services.

IAN CASTLES
Australian Statistician

TABLE 1

Frequency and Percentage Distribution of the Australian Labour Force by ASCO Major Group (Source: 5% dual coded sample of 1986 Census of Population and Housing)

1	Managers and Administrators	766,801	11.77%
2	Professionals	786,543	12.08%
3	Para-Professionals	426,527	6.55%
4	Tradespersons	1,008,591	15.48%
5	Clerks	1,128,132	17.32%
6	Salespersons and Personal Service Workers	823,895	12.65%
7	Plant and Machine Operators, and Drivers	547,758	8.41%
8	Labourers and Related Workers	933,783	14.34%
9	Occupations Inadequately Described or not stated	91,476	1.40%

TOTAL: 6,513,506

TABLE 2

Frequency and Percentage Distribution of the Australian Labour Force by CCLO Major Group (Source: 5% dual coded sample of 1986 Census of Population and Housing)

0	Professional, Technical & Related Workers	1,022,007	15.69%
1	Administrative, Executive and Managerial Workers	458,140	7.03%
2	Clerical Workers	1,231,389	18.91%
3	Sales Workers	598,075	9.18%
4	Farmers, Fishermen, Hunters, Timber Getters & Related Workers	379,107	5.82%
5	Miners, Quarrymen & Related Workers	37,445	0.57%
6	Workers in Transport and Communication	316,885	4.87%
7/8	Tradesmen, Production-Process Workers & Labourers, nec	1,741,469	26.74%
9	Service, Sport & Recreation Workers	619,447	9.51%
10	Members of Armed Services	80,537	1.24%
11	Occupations Inadequately Described or not Stated	29,006	0.45%

TOTAL: 6,513,506

TABLE 3

Percentage Composition of each ASCO Major Group in terms of CCLO Major Groups (Source: 5% dual coded sample of 1986 Census of Population and Housing)

ASCO	CCLO										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7/8**	**9**	**10**	**11**
1	4.56	39.30	6.77	9.02	30.55	0.07	1.13	5.28	2.16	0.81	0.36
2	83.05	2.45	6.94	0.43	0.15	0.04	0.51	3.79	1.55	0.80	0.29
3	56.47	4.01	3.34	3.67	1.09	0.37	3.76	10.06	13.17	3.67	0.39
4	0.77	1.53	0.94	0.91	4.48	0.18	0.29	79.85	8.73	1.92	0.41
5	2.34	2.58	85.07	1.05	0.16	0.02	4.38	2.44	0.79	0.79	0.36
6	5.28	6.03	13.69	54.62	0.15	0.02	1.50	1.15	17.08	0.29	0.20
7	0.24	1.29	1.00	0.35	1.63	3.67	36.33	50.59	2.65	1.79	0.46
8	0.82	0.79	1.02	3.51	8.21	1.29	2.39	51.24	29.79	0.41	0.54
9	6.84	12.85	14.94	4.36	5.70	0.72	2.44	33.12	4.61	8.90	5.53

TABLE 4

Percentage Composition of each CCLO Major Group in terms of ASCO Major Groups (Source: 5% dual coded sample of 1986 Census of Population and Housing)

CCLO	ASCO								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	3.42	63.92	23.57	0.76	2.59	4.26	0.13	0.75	0.61
1	65.78	4.21	3.74	3.37	6.35	10.84	1.54	1.60	2.57
2	4.22	4.43	1.16	0.77	77.94	9.16	0.44	0.77	1.11
3	11.57	0.56	2.62	1.54	1.99	75.25	0.32	5.49	0.67
4	61.78	0.30	1.23	11.92	0.49	0.33	2.36	20.22	1.38
5	1.37	0.94	4.19	4.73	0.66	0.45	53.68	32.22	1.76
6	2.73	1.27	5.06	0.91	15.59	3.90	62.80	7.03	0.70
7/8	2.32	1.71	2.46	46.25	1.58	0.54	15.91	27.48	1.74
9	2.68	1.97	9.07	14.21	1.44	22.72	2.34	44.90	0.68
10	7.71	7.77	19.41	24.03	11.12	2.92	12.21	4.72	10.11
11	8.98	7.32	5.46	13.52	12.99	5.45	8.88	18.08	19.32

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ASCO Expert is available on an annual lease basis. The price depends on the number of copies leased.

To enable us to assess whether or not ASCO Expert will run in your computing environment and which version you will require, please supply the details requested below. Please answer the questions by ticks in the appropriate boxes. Feel free to tick as many boxes as necessary for each question, or add comments to help explain your system.

1. For what purpose is the coding done? ....

    ....

2. What are your main sources of data?

    ☐ Survey forms ☐ Personnel records

    ☐ Administrative forms. Please specify (eg accident reporting forms, client registrations):

    ....

    ☐ Other: specify ....

3. To what level of the classification do you need to code?

    ☐ 1 digit (Major group) ☐ 2 digit (Minor group)

    ☐ 4 digit (Unit group) ☐ 6 digit (Occupation)

4. Do you supply ASCO coded data to any government departments or agencies?

    ☐ Yes: specify .... ☐ No

5. Do you wish the system to record codes to disk or will coders write the codes on forms for subsequent key entry?

    ☐ Disk ☐ Form ☐ Don't know

6. Do you wish to record queries to disk?

    ☐ Yes ☐ No ☐ Don't know

7. What types of IBM compatible microcomputer are available in your organisation to run the ASCO Expert Coding System?

    ☐ XT ☐ AT ☐ PS/2

8.(a) At how many locations within your organisation do you intend to install ASCO Expert?

    Locations ....

   (b) What is the total number of microcomputers on which ASCO Expert would be installed?

    Microcomputers ....

9.(a) Which operating system and which version of that system are you using?

☐ DOS Version .... ☐ OS/2 Version .... ☐ Other: specify ....

(b) If the facility were available, would you like to run ASCO Expert under one of the following graphics environments?

☐ Microsoft Windows ☐ Presentation Manager ☐ GEM

☐ Other: specify ....

10. On which of the following floppy disk formats would you require ASCO Expert delivered?

5.25": ☐ 360Kb ☐ 1.2Mb

3.5": ☐ 720Kb ☐ 1.44Mb

11. ASCO Expert is designed for use with a colour monitor (CGA or better). What types of monitor are you using?

☐ MDA (standard monochrome) ☐ Hercules Graphics Card

☐ CGA (Colour Graphics Monitor) ☐ EGA (Enhanced Graphics Adaptor)

☐ VGA (Virtual Graphics Array) ☐ MCGA (Multi-Colour Graphics Array)

12. How much RAM is available on the machines you intend to use?

☐ 384 Kb ☐ 512 Kb ☐ 640 Kb

☐ 1 MB ☐ Other: specify ....

13. Do your microcomputers have expanded or extended memory facilities?

☐ Yes, expanded memory (LIM 4.0) ☐ Yes, extended memory ☐ No

14. Are your microcomputers equipped with a mouse? If so, which brand and model?

☐ Yes - Brand: .... ☐ No

15. Are you interested in operating the system on a LAN?

☐ Yes ☐ No

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